

C L A I M S

1. A method of manufacturing a gas diffusion electrode, the method comprising:
 - 5 (a) agglomerating a powder mixture with PTFE particles in a dry form to produce a dry an agglomerate;
 - (b) adding an organic solvent to the dry agglomerate to produce a paste;
 - (c) calendering the paste into a thin sheet with a thickness less than 1mm, to form an active layer or gas diffusion layer, one or both of said layers containing a current collector; and
 - 10 (d) combining said active layer and said gas diffusion layer to form a gas diffusion electrode.
2. A method according to claim 1,
15 c h a r a c t e r i z e d i n that agglomeration is carried out using a ball mill for mixing.
3. A method according to claim 2,
c h a r a c t e r i z e d i n that the powders are mixed for more than 30 minutes.
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4. A method according to claim 1,
c h a r a c t e r i z e d i n that agglomeration is carried out using a blender with blades rotating at 1000-3000 rpm.
- 25 5. A method according to claim 4,
c h a r a c t e r i z e d i n that the powders are heated to a temperature in the range of 50-200°C prior to step (a).
6. A method according to claim 4,
30 c h a r a c t e r i z e d i n that an agglomeration time of at least 1 minute is used.
7. A method according to claim 1,
c h a r a c t e r i z e d i n that agglomeration is carried out using a high-speed mill with rotating blades which rotate at more than 10000 rpm.

8. A method according to claim 7,
characterized in that the agglomeration time is from 10 seconds to
5 minutes.

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9. A method according to any of claims 1 to 8,
characterized in that the solvent is slowly added to the agglomerate with
stirring.

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10. A method according to claim 9,
characterized in that the agglomerate is heated during stirring.

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11. A method according to any of claims 1 to 10,
characterized in that the paste is extruded into a thin film prior to
calendering.

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12. A method according to any of claims 1 to 11,
characterized in that a current collector or mechanical support is calend-
ered into said film.

13. A method according to any of claims 1 to 12,
characterized in that the powder mixture forming the active layer is
100 wt% graphite.

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14. A method according to any of claims 1 to 12,
characterized in that the powder mixture forming the active layer compri-
ses 25-75 wt% graphite with platinum, and 25-75 wt% graphite.

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15. A method according to any of claims 1 to 12,
characterized in that the powder mixture forming the active layer compri-
ses 25-75 wt% graphite with Ag, Co, Fe, perovskites or spinells, and 25-75 wt%
graphite.

16. A method according to any of claims 1 to 15,
c h a r a c t e r i z e d i n that PTFE with a particle size less than 1mm is added
to the mixture before agglomeration step (a).
- 5 17. A method according to any of claims 1 to 16,
c h a r a c t e r i z e d i n that the powder mixture comprises 55-75 wt% activated
carbon or graphite and 25-45 wt% PTFE.
- 10 18. A method according to any of claims 1 to 17, comprising a further calender-
ing step wherein said electrode is calendered with a further gas diffusion layer
made according to the method described in steps (a)-(d).
- 15 19. A method according to any of claims 1 to 18,
c h a r a c t e r i z e d i n that said layers are combined in step (d) by calendering
or pressing.
- 20 20. A method according to any of claims 1 to 19,
c h a r a c t e r i z e d i n that said electrode is dried at a temperature less than
40°C.
21. A method according to any of claims 1 to 20,
c h a r a c t e r i z e d i n that said steps (a)-(d) are performed in a continuous
production line.
- 25 22. A method according to any of claims 1 to 21,
c h a r a c t e r i z e d i n that said gas diffusion layer and said active layer are
produced in parallel continuous production lines and said production lines are
combined in the combining step (d).
- 30 23. An electrode manufactured by a method according to any of claims 1-22.
24. A gas diffusion electrode comprising a gas diffusion layer and an active
layer, the gas diffusion layer comprising 55-75 wt% activated carbon or graphite
and 25-45 wt% PTFE and the active layer comprising 25-75 wt% activated carbon

or graphite with noble or non-noble metal catalyst and 25-75 wt% activated carbon or graphite with high surface area ($>100 \text{ m}^2/\text{g}$) and 5-20 wt% PTFE, the gas diffusion layer and the active layer being manufactured according to the method in any of claims 1 to 22.

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25. Use of the gas diffusion electrode according to claim 23 or 24 in fuel cells, metal-air batteries or membranes.